

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED / ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER P67749US0
INTERNATIONAL APPLICATION NO. PCT/KR00/01070	INTERNATIONAL FILING DATE 26 September 2000	US APPLICATION NO.(If known - see 37 CFR 1.5) 10/088499
TITLE OF INVENTION METHOD FOR MANUFACTURING HEATING PAD USING ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN MAINTAINING PATIENTS' BODY TEMPERATURE		
APPLICANT(S) FOR DO/EO/US Jeong Ok Lim and Dong Won PARK		

Applicant herein submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information.

1. This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. A proper Demand for Internatl. Preliminary Examination was made by the 19th month from earliest claimed priority date.
5. A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. has been transmitted by the International Bureau.
 - c. is not required, as the application was filed in the United States Receiving Office (RO/US)
6. A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. have been transmitted by the International Bureau.
 - c. have not been made; however, the time limit for making such amendments has NOT expired.
 - d. have not been made and will not be made.
8. A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. A translation of the annexes to the Internatl. Preliminary Examination report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. An assignment document for recording. A separate cover sheet compliance with 37 CFR 3.28 and 3.31 is included.
13. A **FIRST** preliminary amendment.
 - a. A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. A substitute specification.
15. A change of power of attorney and/or address letter.
16. Other items or information:

International Search Report
PCT Request Form
First Page of Publication
International Preliminary Examination Report - with no annexes
Small Entity Declaration (2 sheets)

US APPLICATION NO.(If known, see 37 CFR 1.5) 10/088499	INTERNATIONAL APPLICATION NO. PCT/KR00/01070	ATTORNEY'S DOCKET NUMBER P67749US0		
17. <input checked="" type="checkbox"/> The following fees are submitted:		CALCULATIONS PTO USE ONLY		
Basic National Fee (37 CFR 1.492(a)(1)-(5)):				
Internat'l. prelim. examination fee paid to USPTO (37 CFR 1.492 (a) (1)) ... \$710.00				
No international preliminary examination fee paid to USPTO (37 CFR 1.492 (a) (2)) but international search fee paid to USPTO (37 CFR 1.445(a)(2)) ... \$740.00				
Neither international preliminary examination fee (37 CFR 1.492 (a) (3)) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO) \$1040.00				
International preliminary examination fee paid to USPTO (37 CFR 1.492 (a) (4)) and all claims satisfied provisions of PCT Article 33(2)-(4) \$100.00				
Search Report prepared by the EPO or JPO (37 CFR 1.492 (a) (5)) \$890.00				
ENTER APPROPRIATE BASIC FEE AMOUNT =		\$ 1040.00		
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).		\$		
Claims	Number Filed	Number Extra	Rate	
Total Claims	1 - 20 =	-0-	x \$18.00	\$
Independent Claims	1- 3 =	-0-	x \$84.00	\$
Multiple Dependent Claim(s) (if applicable)			+ \$280.00	\$
TOTAL OF ABOVE CALCULATIONS =		\$ 1040.00		
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity statement must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).		\$ 520.00		
SUBTOTAL =		\$ 520.00		
Processing fee of \$130 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f))		\$		
TOTAL NATIONAL FEE =		\$ 520.00		
Fee of \$40.00 for recording the enclosed assignment (37 CFR 1.21(h)). Assignment must be accompanied by appropriate cover sheet (37 CFR 3.28, 3.31).		\$ 40.00		
TOTAL FEES ENCLOSED =		\$ 560.00		
		Amt. to be refunded: \$		
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<p>a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>560.00</u> to cover the above fees is enclosed.</p> <p>b. <input type="checkbox"/> Please charge my Deposit Account No. <u>06-1358</u> in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.</p> <p>c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge my account any additional fees set forth in §1.492 during the pendency of this application, or credit any overpayment to Deposit Account No. <u>06-1358</u>. A duplicate copy of this sheet is enclosed.</p>				
SEND ALL CORRESPONDENCE TO:				
JACOBSON HOLMAN PLLC 400 7th Street, N.W., Suite 600 Washington, DC 20004 202-638-6666				
CUSTOMER NUMBER: 00136				
JPH&S 3/95				

By 
 Yoon S. Ham
 Reg. No. 45,307

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Jeong Ok LIM et al.

Serial No.: New

Filing Date: March 28, 2002

For: METHOD FOR MANUFACTURING HEATING PAD USING ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN MAINTAINING PATIENTS' BODY TEMPERATURE

PRELIMINARY AMENDMENT

Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to initial examination, please amend the above-identified application as follows:

IN THE SPECIFICATION

On page 1, immediately following the title, please insert the following sentence: --This is a nationalization of PCT/KR00/01070 filed September 26, 2000 and published in English.--

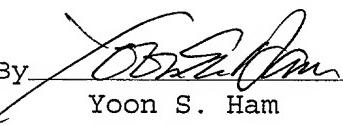
REMARKS

The foregoing Preliminary Amendment is requested in order to place the application in better form for examination.

Early action on the merits is respectfully requested.

Respectfully submitted,

JACOBSON HOLMAN PLLC

By 
Yoon S. Ham
Reg. No. 45,307

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Atty. Docket: P67749US0
Date: March 28, 2002
YSH/cmf

Law Offices of
JACOBSON HOLMAN
PROFESSIONAL LIMITED LIABILITY COMPANY
THE JENIFER BUILDING
400 SEVENTH STREET, N.W.
WASHINGTON, DC 20004

Attny's Docket No. P67749US0

SMALL ENTITY DECLARATION
[37 CFR 1.9(c-f)]

Each undersigned declares that:

(1) the application attached hereto

(2) U.S. Application Serial No. _____ filed _____

(3) U.S. Patent No. _____ issued _____

is entitled to the benefits of "small entity" status for paying reduced fees under 35 USC 41(a) and (b) to the Patent and Trademark Office by virtue of the following

(4) Each undersigned declares that he/she qualifies as an independent inventor or would qualify had he/she made the as defined in 37 CFR 1.9(c)

(5) The undersigned declares that he/she is an official empowered to act on behalf of the concern identified below that concern qualifies as a small business concern as defined in 37 CFR 1.9(d), that exclusive rights to the invention have been conveyed to and remain with the small business concern, or if the rights are not exclusive, that all other rights belong to small entities as defined in 37 CFR 1.9.

(6) The undersigned declares that he/she is an official empowered to act on behalf of the organization identified below organization qualifies as a nonprofit organization as defined in

(a) 37 CFR 1.9(e)(1)

(b) 37 CFR 1.9(e)(2)

(c) 37 CFR 1.9(e)(3)

(d) 37 CFR 1.9(e)(4) State law of _____

that exclusive rights to the invention have been conveyed to and remain with the organization, or if the rights are not exclusive, that all other rights belong to organizations as defined in 37 CFR 1.9

(7) Each person, concern or organization to which I/we have assigned, granted, conveyed or licensed, or am under an under contract or law to assign, grant, convey, or license any rights in the invention is listed below

(a) no such person, concern or organization

(b) persons, concerns or organization listed below

[a separate declaration is required from each named person, concern or organization having rights to this invention averring to their status as "small entities."]

Full Name _____

Address _____

Individual

Small Business Concern

Nonprofit Organization

I/we acknowledge the duty to file, in this application or patent, notification of any change in status resulting in loss of entitlement of small entity prior to paying, or at the time of paying, the earliest of the issue fee or any maintenance fee due after the date on which status as a small entity is no longer appropriate. (37 CFR 1.28(b))

I/we hereby declare all statements made herein of his/her own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application, any patent issued thereon, or any patent to which this declaration is directed.

(8)		Typed Name of Inventor	Signature	Date
		Typed Name of Inventor	Signature	Date
		Typed Name of Inventor	Signature	Date
		Typed Name of Inventor	Signature	Date
(9)		Newruntech Co., Ltd.		
		Name of Small Business Concern or Nonprofit Organization Jin Young Park	By Jin Young Park	March 22, 2002
		Typed Name	Signature	Date
		Title of Signatory		
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2006 RELEASE UNDER E.O. 14176

WO 01/23659

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PCT/KR00/01070

1

METHOD FOR MANUFACTURING HEATING PAD USING
ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN
MAINTAINING PATIENTS' BODY TEMPERATURE

TECHNICAL FIELD

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The present invention relates to a method for manufacturing a heating pad suitable for use in maintaining patients' body temperatures. More particularly, the present invention relates to the coating of an electrically conducting material, such as polypyrrole, polyaniline, or polythiophene, on a cloth in a chemical and an electrical polymerization process, so as to manufacture a heating pad which can safely maintain its temperature at least at $40\pm5^{\circ}\text{C}$ for 1-4 hours

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PRIOR ART

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Since most of the hospital buildings that have recently been constructed or remodeled adopt centrally controlled heating and cooling systems, it is virtually impossible to regulate ward temperatures to accommodate every patient who is admitted to the hospitals. Thus, patients, who usually live in thin gowns for a long period of time in hospitals, are required to control and manage their own individual body temperatures. In particular, the patients who have just undergone surgical operations have difficulty in controlling their own body temperatures because of the stress and bleeding resulting from the operations and the exposure of internal organs to the outside for a long period of time. In fact, since the interior temperatures of hospitals are usually maintained at $22-24^{\circ}\text{C}$ all the year round, the patients on whom operations have just been performed cannot recover their normal body temperature immediately so that they may suffer from shivering and hypoxia

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To prevent such problems which lead the patients to suffer serious consequences, a hypothermic control system or a warming air inflation blanket is typically employed for use in maintaining the body temperature of the patients

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who have just undergone operations Associated with a main body as large as an average washing machine, a hypothermic control system, in which warm water is circulated through a rubber mattress, is limitedly used In addition, it is very expensive As for the warming air inflation blanket, its function of warming patients is performed with warm air which is injected between double-sided covers In addition to being expensive, this blanket, however, causes an environmental problem because it is disposable Further, it is unpleasant to the touch because it is made of vinyl and non-woven fabrics Swelling as warm air is injected, the blanket is inconvenient to cover patients with Meanwhile, an electric blanket, which is extensively used for maintaining warmth, is prohibited from being used in hospitals because the electromagnetic waves generated during its operation may harm the patient and interfere with the operations of precision instruments in operating rooms, directly and indirectly Furthermore, there is always the danger that the patient might receive an electric shock from the blanket because of the presence of water, such as physiological saline and blood, near the patient Moreover, the patient may catch fire if the controller of the electric blanket is out of the order.

DISCLOSURE OF THE INVENTION

It is an object of the present invention to overcome the above problems encountered in prior arts and to provide a method for manufacturing a heating pad which can safely generate heat by taking advantage of the heating properties of an electrically conducting polymer.

Based on the present invention, the above object could be accomplished by a provision of a method for manufacturing a heating pad using an electrically conducting polymer suitable for use in maintaining patients' body temperatures, comprising: a chemical polymerization process in which a cloth is treated with a solution containing dopants, distilled polymerizable monomers and an oxidizer at a high temperature under a high pressure to coat an electrically conducting polymer membrane onto the cloth, said cloth being composed of synthetic fibers such as

nylon or polyester, or a combination of synthetic fibers and natural fibers, an electrical polymerization process in which the cloth is washed with water to detach weakly bonded polymeric materials therefrom and covered with a magnetic patterning sheet such that a polymeric coating is allowed to grow thicker on the 5 exposed areas of the cloth; and an instrumenting process in which a temperature sensor and controller and a portable power supply are provided to the cloth

BRIEF DESCRIPTION OF THE DRAWINGS

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description 10 taken in conjunction with the accompanying drawings, in which

Fig 1 is a schematic view illustrating a high temperature and pressure system for use in the chemical polymerization of electrically conducting monomers in accordance with an embodiment of the present invention,

Fig 2 is a schematic view illustrating a polymerization bath system for 15 use in the electrical polymerization process in accordance with another embodiment of the present invention,

Fig 3 is a side view showing a magnetic patterning sheet in accordance with a further embodiment of the present invention,

Fig 4 is a schematic view illustrating a heating pad equipped with a 20 temperature sensor and controller and a power supply,

Fig 5 shows a temperature profile and a current profile of the heating pad, both of which are plotted with regard to time; and

Fig 6 shows various applications of the heating pad

BEST MODES FOR CARRYING OUT THE INVENTION

The present invention is essentially composed of a chemical 25 polymerization process for coating an electrically conducting polymer membrane

on a gray cloth and an electrical polymerization process for growing a polymer membrane with the aid of a magnetic patterning sheet

In the chemical polymerization process, the electrically conducting polymer membrane is formed at about 50-150 °C under a pressure of 1-3 kgf/cm² by immersing a gray cloth in a bath containing dopants, polymerizable monomers, and an oxidizer. Suitable as the gray cloth is a synthetic fiber, such as a nylon fiber or a polyester fiber. In this process, an electrical current is passed through the cloth, so that it is used as an electrode in the electrical polymerization process

The electrical polymerization process is conducted by applying the electrode with a current density of 1-9 mA/cm² while N₂ gas is bubbled for stirring in a polymerization bath

In order to provide the cloth with flexibility and an efficient heating structure, a pattern of a polymeric coating is formed on the cloth. In this regard, the cloth is covered with the magnetic patterning sheet such that a polymer is allowed to grow thicker on the exposed areas of the cloth. Suitable for use as the polymeric material in the present invention are polypyrrole, polyaniline and polythiophene, all of which are electrically conductive. One or more of these electrically conductive polymers are coated by using a chemical and an electrical polymerization process in combination. A portable battery can be equipped on the heating pad to heat the heating pad to 40-45 °C. Also, a temperature sensor and controller is provided for controlling the temperature of the heating pad at below 45 °C because the skin is burned if it is exposed to higher 45 °C for 1 hour or longer. Thus, the heating pad can be used safely

A better understanding of the present invention may be obtained in light of the following examples which are illustrated with referent to the accompanying drawings and set forth to illustrate, but are not to be construed to limit the present invention

EXAMPLE 1

With reference to Fig. 1, there is a high-temperature, high-pressure system 3 in which chemical polymerization is conducted in accordance with an embodiment of the present invention. As illustrated in Fig. 1, a cloth 1, which is used as a substrate for the heating pad of the present invention, is repeatedly 5 through a bath 2 containing dopants, distilled polymerizable monomers and an oxidizer while a chemical polymerization reaction occurs in the bath 2. To facilitate the chemical polymerization, the bath 2 is heated by a heater 4. During the chemical polymerization, the system 3 is maintained at about 50-150 °C under a pressure of 1-3 kgf/cm² for 3-100 min. The reason why such high temperature 10 and pressure conditions are adopted is that, as in a dyeing process, the electrically conducting polymers obtained are forced to more actively impregnate into the cloth fibers under the high temperature and pressure conditions than under ordinary temperature and pressure conditions. Most of the polymers formed by the chemical polymerization stick to the cloth fibers via physical forces. After 15 completion of the chemical polymerization, the cloth 1 is washed with water to detach the polymers which are weakly associated with the cloth 1. Afterward, the cloth is dried at room temperature or in an oven to give an electrically conducting polymer-impregnated cloth 1'.

EXAMPLE 2

20 With reference to Fig. 2, a polymerization bath system is provided for electrical polymerization according to another embodiment of the present invention. In the polymerization bath system, the cloth 1', which is obtained in Example 1, is allowed to undergo electrical polymerization. In this regard, the working electrode is applied with a current density of 1-9 mA/cm² while the bath 25 is bubbled from its bottom with N₂ gas for stirring. The cloth is subjected to patterning with the aid of a magnet to increase the amount of electrically conducting polymeric materials which are coated onto the cloth and to improve the quality of the coating. To achieve a preferred patterning result, the rotating speed of rollers 5 may be adjusted. Because the ions present in the polymerization bath

are positively charged, when an N pole, which is cathode, faces to an opposing electrode 7, the cations in the polymerization bath are attracted toward the working electrode under the influence of the magnetic field formed, such that the cations coat onto the cloth which closely contacts the working electrode As a result, the
5 cloth is found to be improved in surface morphology as observed with a microscope In addition, the cloth 1' is has a surface resistance of approximately $10 \Omega/\square$, which is lower than that of the cloth which is obtained by electrical polymerization using a patterning sheet

EXAMPLE 3

10 Referring to Fig. 3, there is shown a patterning sheet 6 in a side view, with which a pattern is formed on the cloth upon the electrical polymerization, in accordance with another embodiment of the present invention The patterning is for the purpose of providing the cloth with flexibility In this connection, a magnetic patterning sheet like that shown in Fig. 3 is covered over the cloth so that
15 a polymeric coating is allowed to grow thicker on the exposed areas of the cloth Thus, the rollers are quickly rotated whenever the cloth passes through patterning parts 9 Once the passing of the cloth is completed, electrical polymerization is achieved, giving a pattern after the patterning sheet 6 Because a larger number
20 of cations of the polymerization bath are attracted toward the N poles which are negatively charged, a larger amount of electrically conducting polymer materials are coated on the areas near the N poles

EXAMPLE 4

With reference to Fig 4, there is a heating pad 13 equipped with a temperature sensor, a temperature controller and a power supply 8, which is manufactured in accordance with the present invention When prepared only through chemical polymerization, the cloth is found to range in resistance from approximately 10^0 to $10^2 K\Omega/\square$ However, the coated areas of the cloth which are
25

2022 CODING CONVENTION

patterned with the aid of the patterning sheet are measured to have a resistance of approximately 10^{-2} to $10^2 \Omega/\square$. Therefore, electrical paths on the heating pad are formed along the trace of the patterned parts 10 which are used for the electrical polymerization. Complying with the Joule heating, the calorific power of the heating pad is represented by the following formula: $Q = 0.24 I^2 Rt$ (cal). Depending on the materials, the temperature of the heating pad increases according to the following formula $Q=C_m m \Delta T$ wherein C_m represents heat capacity and m represents a mass.

EXAMPLE 5

With reference to Fig. 5, there is a temperature profile of a heating pad manufactured in accordance with the present invention, which is plotted with regard to a period of time, along with a current profile provided to the heating pad. To obtain the temperature profile, a 12 V lithium ion battery was mounted on the heating pad which was then tested for heating. As shown in the temperature profile, the heating pad is heated to above 40 °C shortly after the supply of power from the battery and is maintained at more than 40 °C for 8 hours or longer.

INDUSTRIAL APPLICABILITY

As described hereinbefore, a heating pad can be manufactured by coating a cloth with an electrically conducting polymeric material which generates no 20 generating electromagnetic wavelengths harmful to the body in a combination of a chemical and an electrical polymerization process. To the heating pad, a portable power supply is provided for generating heat and a temperature sensor and controller for controlling the temperature.

Although the heating pad of the present invention has been described for 25 use in maintaining patients' body temperatures, it will be understood that the teachings herein can be applied to various products as well, including grooves, dresses, shoes, tents, etc., as shown in Fig. 6.

While the foregoing examples illustrate and describe the use of the present invention, they are not intended to limit the present invention as disclosed in certain preferred embodiments herein. Therefore, variations and modifications commensurate with the above teachings and the skill and/or knowledge of the relevant art, are within the scope of the present invention.

CLAIM

1 A method for manufacturing a heating pad using an electrically conducting polymer suitable for use in maintaining patients' body temperatures, comprising:

5 a chemical polymerization process in which a cloth is treated with a solution containing dopants, distilled polymerizable monomers and an oxidizer at a high temperature under a high pressure to coat an electrically conducting polymer membrane onto the cloth, said cloth being composed of synthetic fibers such as nylon or polyester, or a combination of synthetic fibers and natural fibers;

an electrical polymerization process in which the cloth is washed with water to detach weakly bonded polymeric materials therefrom and covered with a magnetic patterning sheet such that a polymeric coating is allowed to grow thicker on the exposed areas of the cloth, and

an instrumenting process in which a temperature sensor and controller and
15 a portable power supply are provided to the cloth.

Abstract

Disclosed is a method for manufacturing a heating pad using an electrically conducting polymer suitable for use in maintaining patient' body temperatures. A cloth made of a synthetic fiber or a natural fiber is treated in a bath containing dopants, distilled polymerizable monomers, and an oxidizer under such a high temperature and pressure that an electrically conducting polymer is chemically formed on the cloth. After being washed, the cloth is covered with a patterning sheet such that electrical polymerization is conducted to grow a polymeric coating according to the pattern of the patterning sheet. The heating pad has a resistance of 10-2-102 ?/ ?. To the heating pad, a temperature sensor and controller is provided for safely maintaining patient' body temperatures.

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FIG 1.

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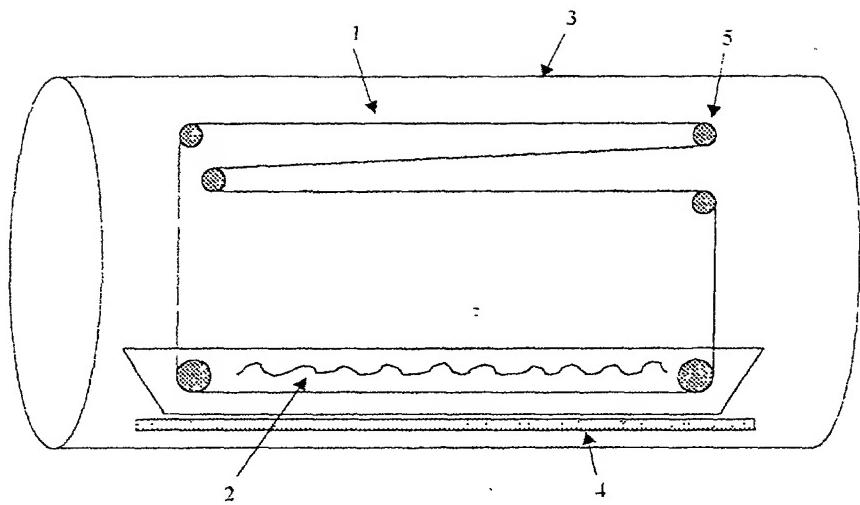
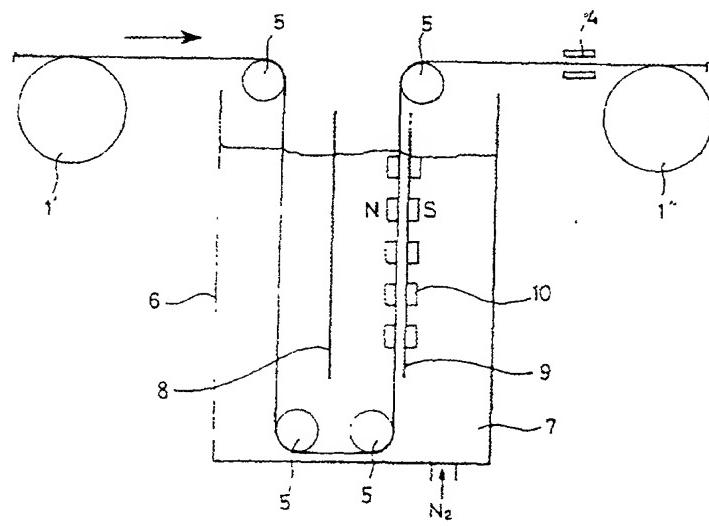


FIG 2.



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FIG 3.

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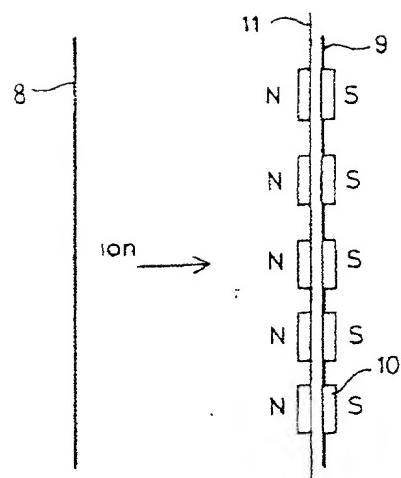
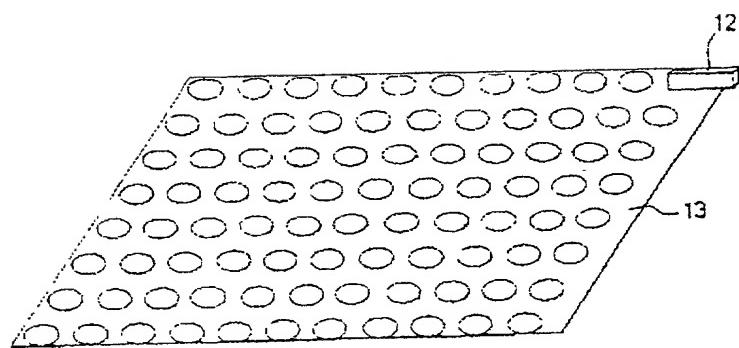


FIG 4.



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FIG 5.

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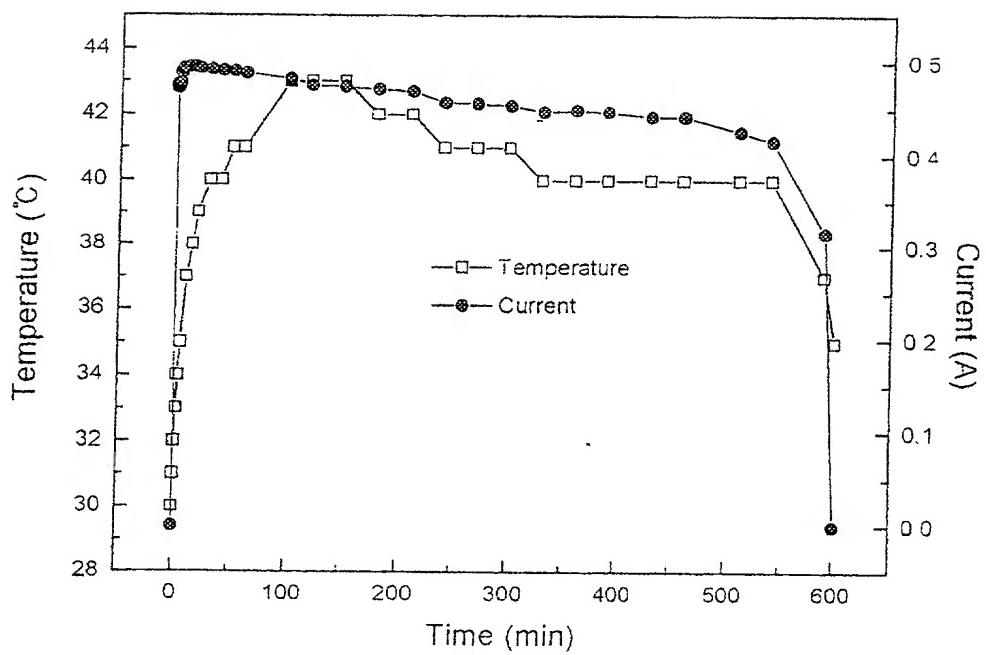
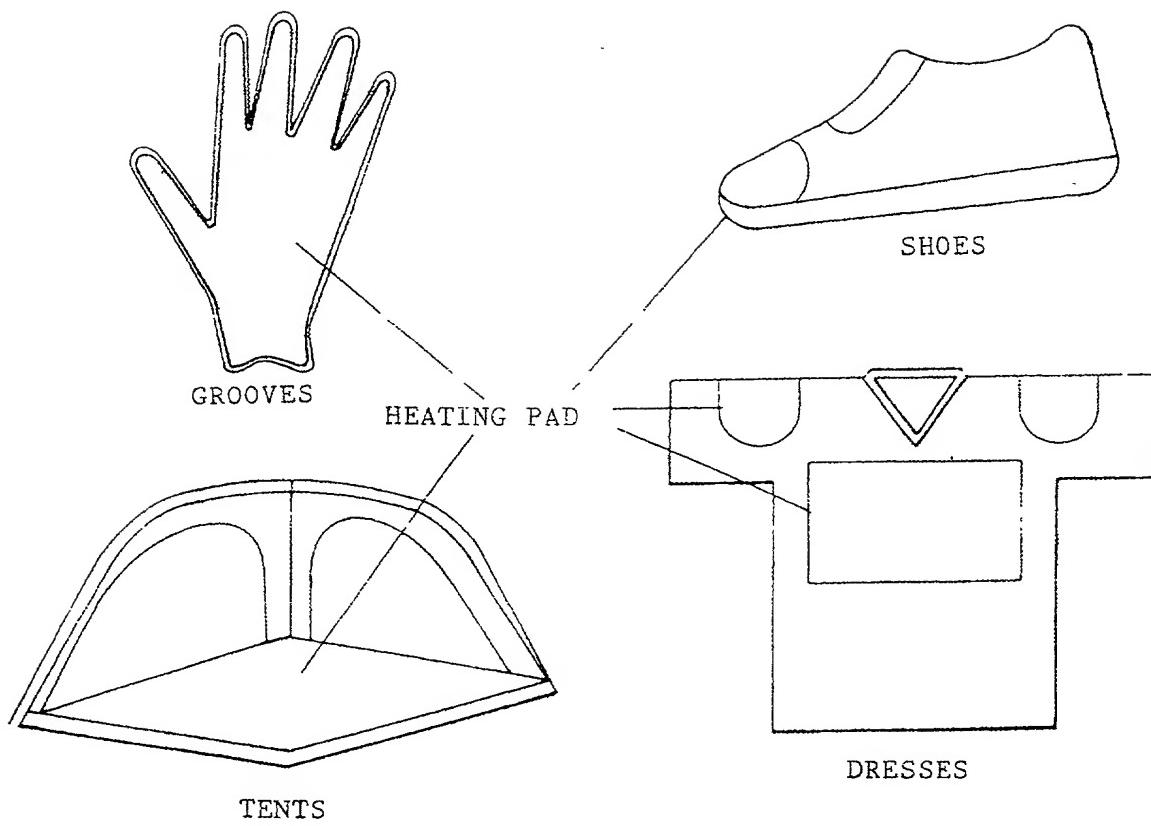


FIG 6.

4/4



**DECLARATION
AND POWER OF ATTORNEY**

U.S.A.

ALL PATENTS, INCLUDING DESIGN

FOR APPLICATION BASED ON PCT, PARIS CONVENTION,

FOR ATTORNEYS USE ONLY

ATTORNEYS' DOCKET NO

P67749US0

As a below named inventor, I declare that my residence, post office address and citizenship are stated below next to my name, the information given herein is true, that I believe that I am the original first and sole inventor (if only one name is listed at 201 below), or an original, first and joint inventor (if plural inventors are named below at 201-203, or on additional sheets attached hereto) of the subject matter which is claimed and for which patent is sought on the invention entitled

101

METHOD FOR MANUFACTURING HEATING PAD USING ELECTRICALLY CONDUCTING POLYMER SUITABLE FOR USE IN

MAINTAINING PATIENTS' BODY TEMPERATURE

which is described and claimed in PCT International Application No. PCT/KR00/01070 filed 26 September 2000
 the specification in application Serial No. filed

(if applicable) and amended on

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above
I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, §1.56
I hereby claim foreign priority benefits under Title 35, United States Code, §119 (a)-(d) of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed

Prior Foreign Application(s)

			Priority Claimed	
1999/41954	Korea	30 September 1999	<input checked="" type="checkbox"/>	<input type="checkbox"/>
(Number)	(Country)	(Day/Month/Year Filed)	Yes	No
			<input type="checkbox"/>	<input type="checkbox"/>
103	(Number)	(Country)	(Day/Month/Year Filed)	Yes No
			<input type="checkbox"/>	<input type="checkbox"/>
	(Number)	(Country)	(Day/Month/Year Filed)	Yes No

I hereby claim the benefit under Title 35, United States Code, §119(e) of any United States provisional application(s) listed below

Application No. Filing Date Application No. Filing Date

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose information which is material to

(Application Serial No.) (Filing Date) (Status patented, pending, abandoned)

POWER OF ATTORNEY As a named inventor, I hereby appoint the following attorneys (Registration No.) to prosecute this application, receive and act on instructions from my agent, and transact all business in the Patent and Trademark Office connected therewith HARVEY B. JACOBSON, JR. (20,851), JOHN CLARKE HOLMAN (22,769), MARVIN R. STERN (20,640), ALLEN S. MELSER (27,215), MICHAEL R. SLOBASKY (26,421), JONATHAN L. SCHERER (29,851), IRWIN M. AISENBERG (19,007), WILLIAM E. PLAYER (31,409), YOON S. HAM (45,307) and NATHANIEL A. HUMPHRIES (22,772)

SEND CORRESPONDENCE TO	CUSTOMER NO. 00136 or JACOBSON HOLMAN PROFESSIONAL LIMITED LIABILITY COMPANY 400 SEVENTH STREET, N.W. WASHINGTON, D.C. 20004	DIRECT TELEPHONE CALLS TO (please use Attorney's Docket No.) (202) 638-6666 JACOBSON HOLMAN PROFESSIONAL LIMITED LIABILITY COMPANY
------------------------	--	--

Inventor(s) name must include at least one unabbreviated first or middle name

201	FULL NAME * OF INVENTOR	FAMILY NAME	GIVEN NAME	MIDDLE NAME	
	LIM		Jeong	Ok	
202	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	Taegu	KOREA	KRX	KOREA	
203	POST OFFICE ADDRESS	POST OFFICE ADDRESS	CITY	STATE OR COUNTRY	ZIP CODE
	Chimsan 3-dong, Buk-gu	106-405 Dong-A Apt,	Taegu	KOREA	702-053
204	FULL NAME * OF INVENTOR	FAMILY NAME	GIVEN NAME	MIDDLE NAME	
	PARK		Dong	Won	
205	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
	Taegu	KOREA	KRX	KOREA	
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	mansion, Chisan-dong, Susung-gu	105-1102 Hyp-Hwa	Taegu	KOREA	705-090
207	FULL NAME * OF INVENTOR	FAMILY NAME	GIVEN NAME	MIDDLE NAME	
208	RESIDENCE & CITIZENSHIP	CITY	STATE OR FOREIGN COUNTRY	COUNTRY OF CITIZENSHIP	
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I further declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon

SIGNATURE OF INVENTOR 201*	SIGNATURE OF INVENTOR 202*	SIGNATURE OF INVENTOR 203*
Limjeongyok. DATE March 22, 2002.	park dong won DATE march 22, 2002	DATE

Additional inventors are named on separately numbered sheets attached hereto

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